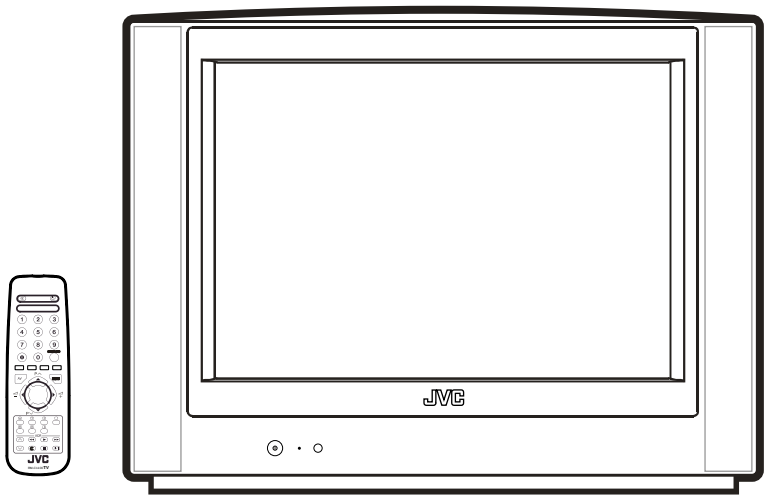
JVC

SERVICE MANUAL

COLOUR TELEVISION

AV-28KT1BUF/A, /B, /C,
AV-28KT1SUF/A, /B, /C



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No.52137
2003/9

SPECIFICATION

Items		Contents
Dimensions (W × H × D)		76cm × 57cm × 47.3cm
Mass		33kg
TV RF System		B/G, D/K, L/L'
Colour System	TV Mode	PAL / SECAM
	Video Mode	PAL / SECAM / NTSC 3.58 / NTSC 4.43
Sound System		NICAM / A2 (Germany system)
Teletext System		FLOF (Fastext) / TOP (German system)
Tuning System		Frequency synthesizer tuning system
Number of CH memory position		100 ch
Receiving Frequency	VHF Low	46.25MHz ~ 168.25MHz
	VHF High	175.25MHz ~ 463.25MHz
	UHF	471.25MHz ~ 863.25MHz
	CATV	S01-S41 & S75-S79
Intermediate Frequency	VIF	38.9MHz (B/G, D/K, L) / 33.9MHz (L')
	SIF	33.4MHz (5.5MHz:B/G) / 32.9MHz (6.0MHz:D/K) / 32.4MHz (6.5MHz:L) / 40.4MHz (6.5MHz:L')
Colour Sub Carrier Frequency		PAL (4.43MHz), SECAM (4.43MHz), NTSC (3.58MHz/4.43MHz)
Power Input		AC220V ~ AC240V, 50Hz
Power Consumption		120W(Max), 3W(Standby)
Aerial Input Terminal		75Ω unbalanced, coaxial
Picture Tube		Visible size : 66cm (Measured diagonally)
High Voltage		30kV
Speaker		Main:5.7cm × 16cm oval type × 2
Audio Output		10W + 10W
Input	Video	1V(p-p) 75Ω
	S-Video	Y : 1V(p-p) positive
		C : 0.286V(p-p)
	Audio (L/R)	500mV(rms) (-4dBs), High impedance (RCA pin jack × 2)
Output	Video	1V(p-p) 75Ω
	Audio (L/R)	500mV(rms), Low Impedance
Input Terminal	Rear Side	EXT-1 (Video / Audio / RGB)
		EXT-2 (Video / Audio / RGB / S-VHS)
	Right Side	EXT-3 (Video / Audio)
Output Terminal	Rear Side	EXT-1 (Video / Audio)
		EXT-2 (Video / Audio)
	Right Side	Headphone Jack (Stereo mini jack Ø3.5mm × 1)
Remote Control Unit		VE-30017763 (RM-C1100), (AA/R06 dry battery × 2)

Design & specifications are subject to change without notice.

SECTION 1
PRECAUTION

1.1 SAFETY PRECAUTIONS

(1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

(2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

(3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (⚠) on the parts list in Service manual**. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.

(4) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : (⊥) side GND, the ISOLATED (NEUTRAL) : (⏚) side GND and EARTH : (⏚) side GND.
Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time with a measuring apparatus (oscilloscope etc.). If above note will not be kept, a fuse or any parts will be broken.

(5) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See B1 POWER SUPPLY check).

(6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.

(7) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10kΩ 2W resistor to the anode button.

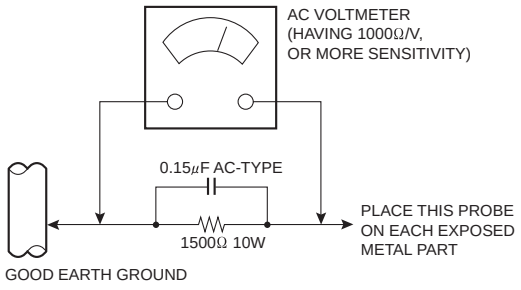
(8) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(9) **Isolation Check (Safety for Electrical Shock Hazard)**
After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) **Dielectric Strength Test**
The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (. . . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)
This method of test requires a test equipment not generally found in the service trade.

b) **Leakage Current Check**
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

Alternate Check Method
Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000Ω per volt or more sensitivity in the following manner. Connect a 1500Ω 10W resistor paralleled by a 0.15μF AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).
However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



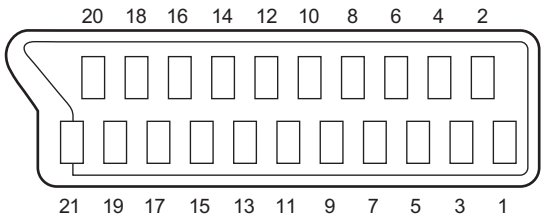
SECTION 2
SPECIFIC SERVICE INSTRUCTIONS

2.1 21-pin Euro connector (SCART) : EXT-1 / EXT-2

Pin No.	Signal Designation	Matching Value	EXT-1	EXT-2
1	AUDIO R output	500mV(rms) (Nominal), Low impedance	Used	Used
2	AUDIO R input	500mV(rms) (Nominal), High impedance	Used (R1)	Used (R2)
3	AUDIO L output	500mV(rms) (Nominal), Low impedance	Used	Used
4	AUDIO GND	---	Used	Used
5	GND (B)	---	Used	Used
6	AUDIO L input	500mV(rms) (Nominal), High impedance	Used (L1)	Used (L2)
7	B input	700mV(B-W), 75 Ω	Used	Used
8	FUNCTION SW (SLOW SW)	Low : 0V-3V, High : 8V-12V, High impedance	Used	Used
9	GND (G)	---	Used	Used
10	SCL / T-V LINK	---	Not used	Used (SCL / TV-LINK)
11	G input	700mV(B-W), 75 Ω	Used	Used
12	SDA3	---	Not used	Not used
13	GND (R)	---	Used	Used
14	GND (YS)	---	Used	Used
15	R / C input	R : 700mV(B-W), 75 Ω C : $300mV_{(P-P)}$, 75 Ω	Used (R)	Used (C2/R)
16	Ys input (FAST SW)	Low : 0V-0.4V, 75 Ω High : 1V-3V, 75 Ω	Used	Used
17	GND (VIDEO output)	---	Used	Used
18	GND (VIDEO input)	---	Used	Used
19	VIDEO output	$1V_{(P-P)}$ (Negative sync), 75 Ω	Used	Used
20	VIDEO / Y input	$1V_{(P-P)}$ (Negative sync), 75 Ω	Used	Used
21	COMMON GND	---	Used	Used

(P-P= Peak to Peak, B-W= Blanking to white peak)

[Pin assignment]



2.2 FEATURES

- It is a remote controlled color television.
- 100 programs from VHF, UHF bands or cable channels can be preset.
- It can tune cable channels.
- Controlling the TV is very easy by its menu driven system.
- It has two Euroconnector sockets for external device (such as video recorder, video games, audio set, etc.)
- Side AV Input (EXT-3) available.
- Stereo sound systems (German + Nicam) are available.
- Full function Teletext (Fastext, Toptext).
- It is possible to connect headphone.
- Direct channel access.
- APS (Automatic Programming System).
- All programs can be named.
- Forward or backward automatic tuning.
- Sleep timer.
- Child Lock.
- Blue Background
- T-V Link
- Automatic sound mute when no transmission.
- 5 minutes after the broadcasting (close down), the TV switches itself automatically to stand-by mode.
- WSS (Wide Screen Signaling)
- NTSC Playback.

2.3 MAIN DIFFERENCE LIST

⚠	Part Name	AV-28KT1BUF	AV-28KT1SUF
	MODEL COLOUR	BLACK MODEL	SILVER MODEL
⚠	FRONT CABINET	VE-20121492	VE-20119985
⚠	BACK COVER	VE-20121494	VE-20111863
⚠	BACK DOOR	VE-20108124	VE-20120043
⚠	FUNCTION BUTTON	VE-20091798	VE-20096498
⚠	POWER BUTTON	VE-20111864	VE-20120046
	JVC LOGO	VE-40013592	VE-40013593
	CARTON BOX	VE-50038917	VE-50038907

2.4 DIFFERENCE LIST BY ELECTRONICS

Part Name	AV-28KT1BUF/A AV-28KT1SUF/A	AV-28KT1BUF/B AV-28KT1SUF/B	AV-28KT1BUF/C AV-28KT1SUF/C
MAIN PWB	VE-20120604	VE-20127801	VE-20127796
IC500 (MI-COM)	VE-20139901	VE-20137151	VE-20139902
IC502 (MEMORY)	VE-20120610	VE-20134092	VE-20126318

2.5 DIFFERENCE LIST BY OSD LANGUAGE

Part Name	AV-28KT1BUF/A AV-28KT1SUF/A	AV-28KT1BUF/B AV-28KT1SUF/B	AV-28KT1BUF/C AV-28KT1SUF/C
OSD LANGUAGES	ENG, GER, FRE, ITA SPA, DUT, POR, TUR	ENG, GER, FRE, SWE NOR, DAN, FIN, GRE	ENG, GER, CZE, POL HUN, BUL, ROM, CRO

SECTION 3
DISASSEMBLY

3.1 DISASSEMBLY PROCEDULE

3.1.1 REMOVING THE REAR COVER

(1) Unplug the power cord.
(2) Remove the 8 screws **[A]** as shown in the Fig. 1.
(3) Remove the 4 screws **[B]**.
(4) Withdraw the REAR COVER toward you.

3.1.2 REMOVING THE BACK DOOR

- Remove the REAR COVER
  (1) Remove the 2 screws **[C]**.
  (2) Withdraw the BACK DOOR toward you.

3.1.3 REMOVING THE SPEAKER

- Remove the REAR COVER.
  (1) Remove the 4 screws **[I]**, and remove the SPEAKER.
  (2) Remove the other hand SPEAKER in the same steps.

3.1.4 REMOVING THE MAIN PWB

- Remove the REAR COVER.
- Remove the BACK DOOR.
  (1) Remove the 4 screws **[D]**.
  (2) Slightly raise the both sides of the MAIN PWB by hand and withdraw the MAIN PWB backward.

CAUTION:
If necessary, take off the wire clamp, connectors etc.
Be careful enough when developing a MAIN PWB.

3.1.5 REMOVING THE SIDE CONTROL PWB

- Remove the REAR COVER.
  (1) Remove the 4 screws **[E]**.
  (2) Remove the SIDE PWB.

3.1.6 REMOVING THE BASE

- Remove the REAR COVER.
  (1) Remove the 2 screws **[F]**.
  (2) Remove the BASE.

NOTE:
Work after fixing so that a CRT screen may be placed upside down or it may not fall.

3.1.7 REMOVING THE POWER SWITCH PWB

- Remove the REAR COVER.
- Remove the BASE.
  (1) Remove the 2 screws **[G]**, and remove the POWER SWITCH PWB.

3.1.8 REMOVING THE LED PWB

- Remove the REAR COVER.
- Remove the BASE.
- Remove the POWER SWITCH PWB.
  (1) Remove the 2 screws **[H]**, and remove the LED PWB.

3.1.9 CHECKING THE PW BOARD

- To check the back side of the PW Board.
  (1) Pull out the PW Board. (Refer to REMOVING THE MAIN PWB).
  (2) Erect the PW Board vertically so that you can easily check the back side of the PW Board.

3.1.10 CAUTION

- When erecting the PW Board, be careful so that there will be no contacting with other PW Board.
- Before turning on power, make sure that the wire connector is properly connected.
- When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PW board.

3.1.11 WIRE CLAMPING AND CABLE TYING

(1) Be sure to clamp the wire.
(2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

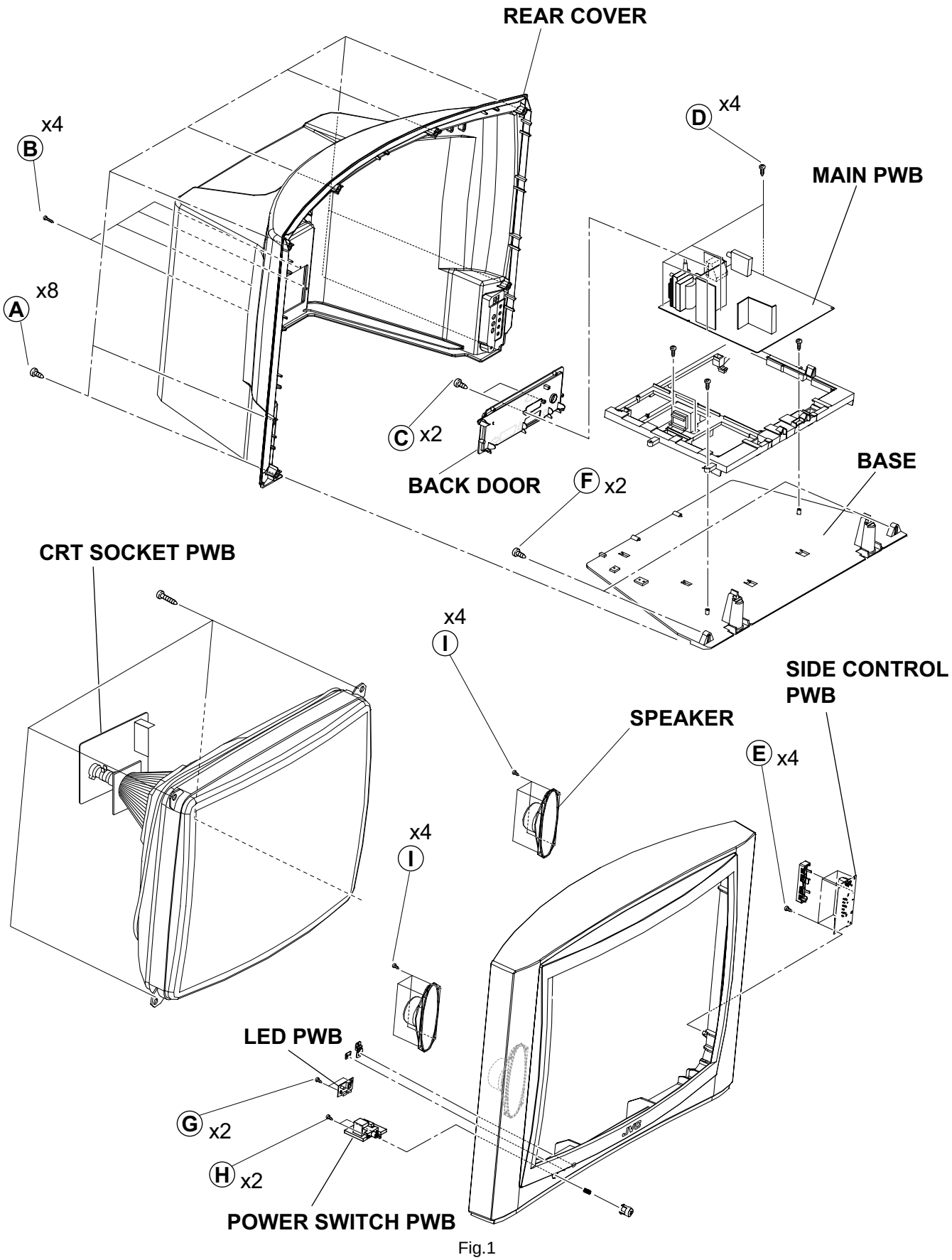

REAR COVER
x4
B
x4
D
MAIN PWB
x8
A
C x2
BACK DOOR
F x2
BASE
CRT SOCKET PWB
x4
I
SIDE CONTROL PWB
SPEAKER
E x4
x4
I
LED PWB
G x2
H x2
POWER SWITCH PWB

Fig.1

3.2 REPLACEMENT OF CHIP COMPONENT

3.2.1 CAUTIONS

(1) Avoid heating for more than 3 seconds.
(2) Do not rub the electrodes and the resist parts of the pattern.
(3) When removing a chip part, melt the solder adequately.
(4) Do not reuse a chip part after removing it.

3.2.2 SOLDERING IRON

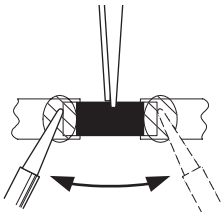
(1) Use a high insulation soldering iron with a thin pointed end of it.
(2) A 30w soldering iron is recommended for easily removing parts.

3.2.3 REPLACEMENT STEPS

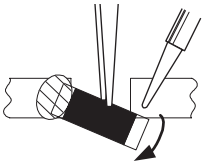
1. How to remove Chip parts

[Resistors, capacitors, etc.]

(1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



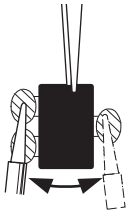
(2) Shift with the tweezers and remove the chip part.



[Transistors, diodes, variable resistors, etc.]

(1) Apply extra solder to each lead.

(2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



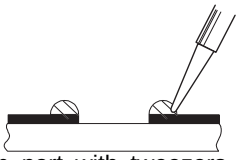
NOTE :

After removing the part, remove remaining solder from the pattern.

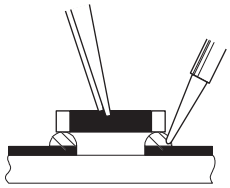
2. How to install Chip parts

[Resistors, capacitors, etc.]

(1) Apply solder to the pattern as indicated in the figure.

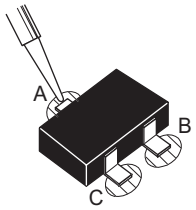


(2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

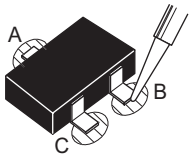


[Transistors, diodes, variable resistors, etc.]

(1) Apply solder to the pattern as indicated in the figure.
(2) Grasp the chip part with tweezers and place it on the solder.
(3) First solder lead **A** as indicated in the figure.



(4) Then solder leads **B** and **C**.



3.3 SETTING OF THE LAST MEMORY FOR SHIPMENT

3.3.1 USER SETTING VALUES

<table>
<tr><th>Setting Item</th><th>Setting Value</th><th>Setting Item</th><th>Setting Value</th></tr>
<tr><td colspan="2">SOUND MENU</td><td colspan="2">FEATURE MENU</td></tr>
<tr><td>BALANCE</td><td>CENTER</td><td>SLEEP TIMER</td><td>OFF</td></tr>
<tr><td>BASS</td><td>CENTER</td><td>CHILD LOCK</td><td>OFF</td></tr>
<tr><td>TREBLE</td><td>CENTER</td><td>LANGUAGE</td><td>ENGLISH</td></tr>
<tr><td>HYPER SOUND</td><td>OFF</td><td>EXT-2 OUTPUT</td><td>TV</td></tr>
<tr><td colspan="2">PICTURE MENU</td><td>BLUE BACKGROUND</td><td>ON</td></tr>
<tr><td>BRIGHTNESS</td><td rowspan="5">These adjust are automatically restored when A.P.S. bit in Service menu is set.
The procedure for setting APS bit is described bellow.</td><td colspan="2">INSTALL. MENU</td></tr>
<tr><td>CONTRAST</td><td>PROGRAMME</td><td rowspan="10">Refer to instruction book</td></tr>
<tr><td>COLOUR</td><td>BAND</td></tr>
<tr><td>SHARPNESS</td><td>CHANNEL</td></tr>
<tr><td>HUE (only NTSC)</td><td>STANDARD</td></tr>
<tr><td>PICTURE MODE</td><td>USER</td><td>COLOUR SYSTEM</td></tr>
<tr><td>COLOUR TEMP</td><td>NORMAL</td><td>DECODER (EXT-2)</td></tr>
<tr><td>ZOOM</td><td>AUTO</td><td>FINE TUNING</td></tr>
<tr><td colspan="2" rowspan="2"></td><td>SEARCH</td></tr>
<tr><td>STORE</td></tr>
</table>

3.3.2 SETTING A.P.S. (AUTO STORE)

(1) Press [MENU] key on the remote control unit to display the main menu.
(2) Press [▲/▼] keys to select PROGRAM item, them [◀/▶] keys to display the PROGRAM menu.
(3) Press the [BLUE] key to enter the AUTOSTORE mode.
(4) Press [▲/▼] keys to choose the COUNTRY, then press [◀/▶] keys the choose country you are nou located.
(5) Press [▲/▼] keys to choose the CONTINUE, then press [▶] key to start A.P.S. The following message appears.

NOTE:
To cancel the A.P.S., press the [STANDARD] key.

(6) After A.P.S. is finalized, the PROGRAM menu appears again.
(7) Press [STANDARD] key to exit main menu.

SECTION 4
ADJUSTMENT

4.1 ADJUSTMENT PREPARATION

(1) You can make the necessary adjustments for this unit with either the Remote Control Unit or with the adjustment tools and parts as given below.
(2) Adjustment with the Remote Control Unit is made on the basis of the initial setting values, however, the new setting values which set the screen to its optimum condition may differ from the initial settings.
(3) Make sure that AC power is turned on correctly.
(4) Turn on the power for set and test equipment before use, and start the adjustment procedures after waiting at least 30 minutes.
(5) Unless otherwise specified, prepare the most suitable reception or input signal for adjustment.
(6) Never touch any adjustment parts which are not specified in the list for this adjustment - variable resistors, transformers, condensers, etc.
(7) Presetting before adjustment.
Unless otherwise specified in the adjustment instructions, preset the following functions with the remote control unit:

Setting Item	Setting value
BRIGHTNESS	CENTER
CONTRAST	
COLOUR	
SHARPNESS	
COLOUR TEMP	
ZOOM	AUTO

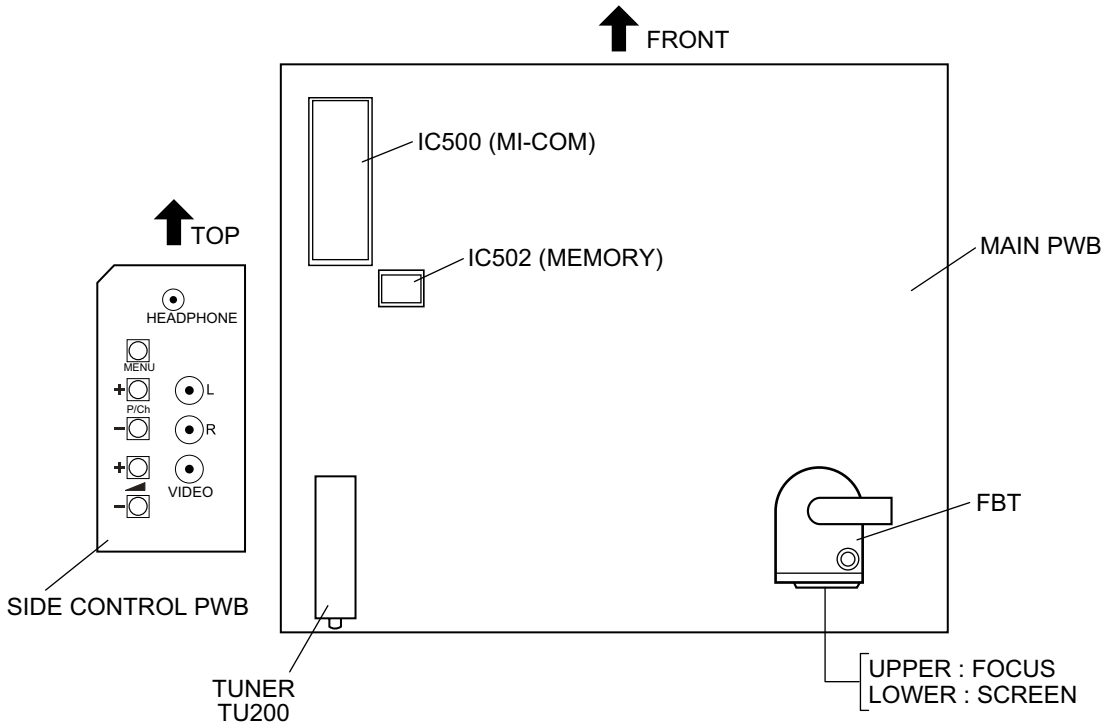
4.2 MEASURING EQUIPMENT

(1) DC voltmeter (or digital voltmeter)
(2) Signal generator (Pattern generator)
[PAL / SECAM / NTSC]
(3) Remote control unit

4.3 ADJUSTMENT ITEM

- SCREEN ADJUSTMENT
- DEFLECTION CIRCUIT ADJUSTMENT
- WHITE BALANCE ADJUSTMENT

4.4 ADJUSTMENT LOCATIONS



4.5 BASIC OPERATION OF SERVICE MENU

4.5.1 HOW TO ENTER THE SERVICE MENU

(1) Press the [INFORMATION] key and [MUTING] key simultaneously in the main menu, and the SERVICE MENU screen (Fig.1) will be displayed.

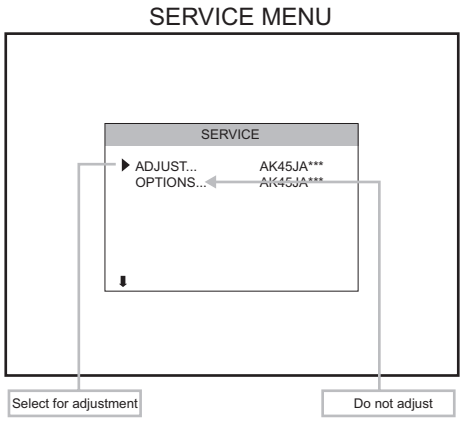


Fig.1

(2) While the SERVICE MENU screen is displayed, press the [▲/▼] and [◀ / ▶] key and select the "ADJUST...", then ADJUST MENU sucreen (Fig.2) will be displayed.

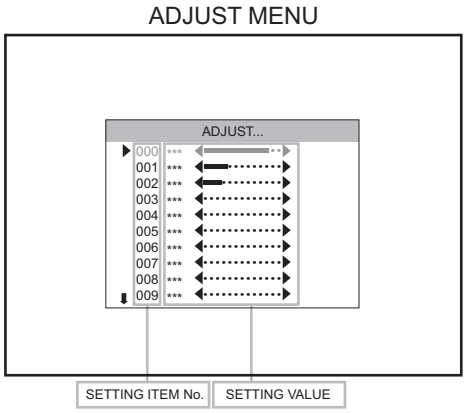


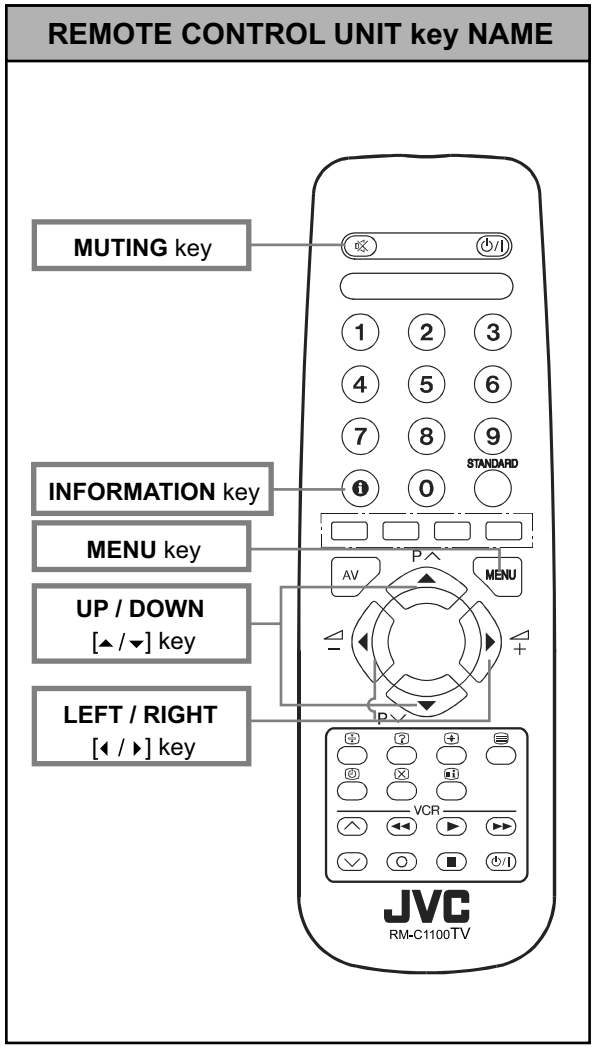
Fig.2

4.5.2 SELECTION OF ADJUSTMENT ITEMS

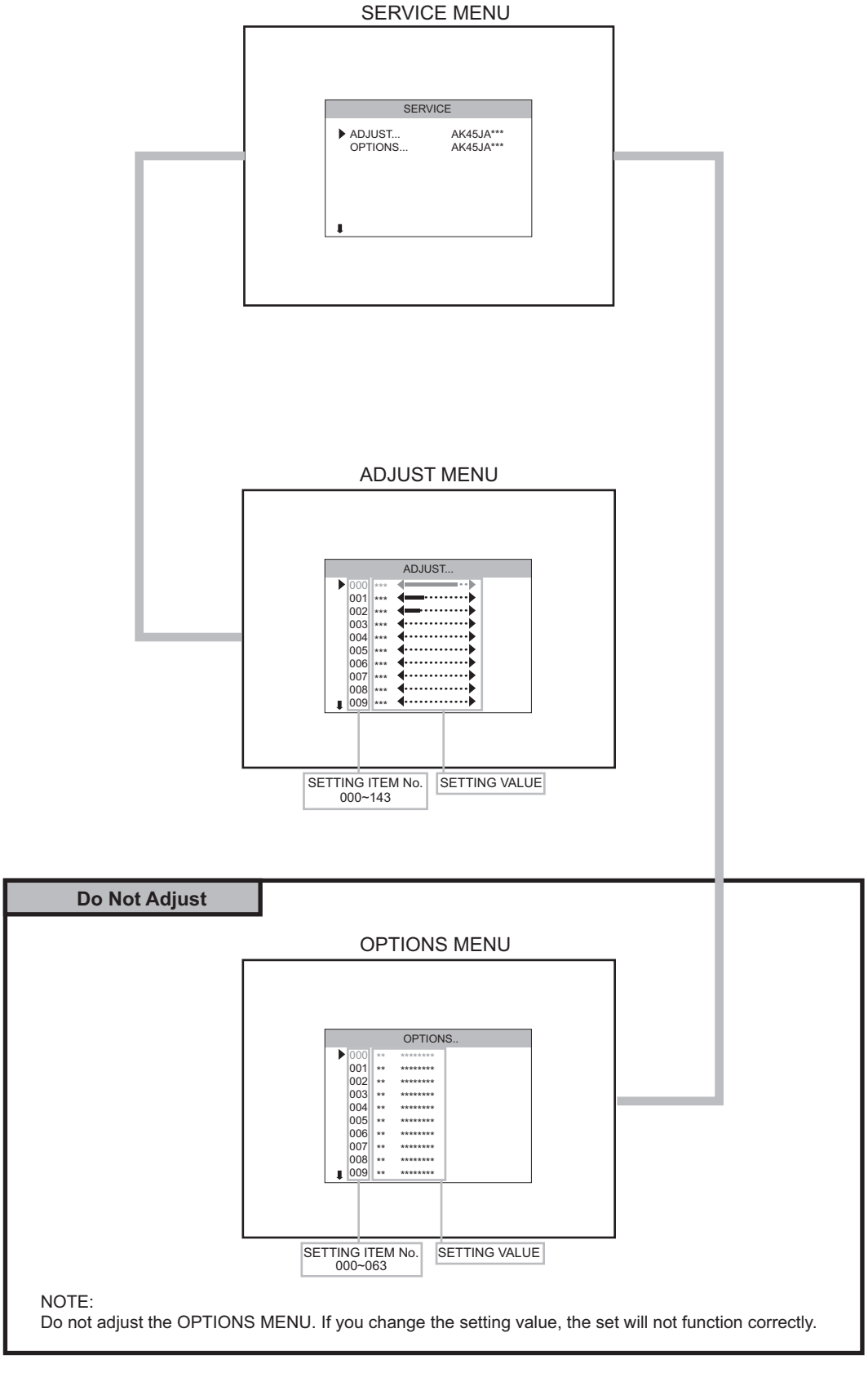
(1) Enter the SERVICE MENU and select ADJUST.
(2) Press the [▲/▼] key and select the ADJUSTMENT ITEM.
(3) Press the [◀ / ▶] key and set the SETTING VALUE.
(4) Changed values are stored automatically.

4.5.3 HOW TO EXIT SERVICE MODE

(1) Press the [MENU] key.



4.5.4 SERVICE MENU SCREEN



NOTE:
Do not adjust the OPTIONS MENU. If you change the setting value, the set will not function correctly.

ADJUSTMENT ITEM

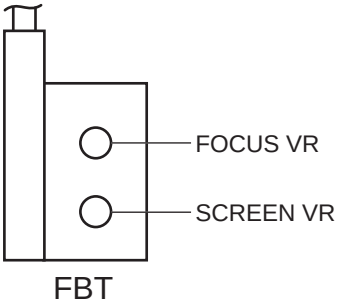
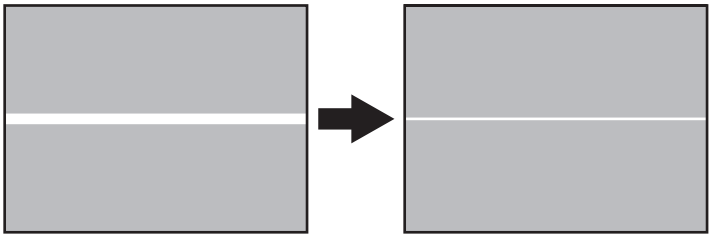
adjustment No.	adjustment part	description
000	White Point RED	Not used
001	White Point GREEN	Not used
002	Whit Point BLUE	Not used
003	AGC (Automatic Gain Control)	
004	IF-PLL Negative	Not used
005	IF-PLL Positive	Not used
006	Y-Delay	
007	Y-Delay SECAM	
008	Y-Delay NTSC	
009	Y-Delay OTHER	Not used
010	Vertical Position Offset	Fixed
011	Vertical Amplitude Offset	Fixed
012	Horizontal Position Offset	Fixed
013	Horizontal Amplitude Offset	Fixed
014	Vertical Blank Start (It will be used only at 4:3 tube for 16:9 mode adjustment)	
015	Vertical Blank Stop (It will be used only at 4:3 tube for 16:9 mode adjustment)	
016	Angle	
017	Bow	
018	4:3 Horz. Blank Start	Do not adjust
019	4:3 Horz. Blank Stop	Do not adjust
020	EHTV compensation	
021	EHTTM compensation	
022	EHTEW compensation	
023	WDR	Video processor adjust itself.
024	WDG	
025	WDB	
026	CR	
027	CG	
028	CB	
029	COR coring level	
030	REGULAR VERT_POS (Vertical Position)	
031	REGULAR VERT_AMPL (Vertical Amplitude)	
032	REGULAR VERT_SCOR (Vertical S Correction)	
033	REGULAR VERT_SSYM (Vertical S Symmetry)	
034	REGULAR TRAPEZE	
035	REGULAR CUSHION	
036	REGULAR HOR_COR_SYM(Horizontal Corner Symmetry)	
037	REGULAR HOR_CORNER (Horizontal Corner)	
038	REGULAR HORZ_POS (Horizontal Position)	
039	REGULAR HORZ_AMPL (Horizontal Amplitude)	
040	PANORAMIC VERT_POS	Not used
041	PANORAMIC VERT_AMPL	Not used
042	PANORAMIC VERT_SCOR	Not used
043	PANORAMIC VERT_SSYM	Not used
044	PANORAMIC TRAPEZE	Not used
045	PANORAMIC CUSHION	Not used
046	PANORAMIC HOR_COR_SYM	Not used
047	PANORAMIC HOR_CORNER	Not used
048	PANORAMIC HORZ_POS	Not used

adjustment No.	adjustment part	description
049	PANORAMIC HORZ_AMPL	Not used
050	14:9 ZOOM VERT_POS	Not used
051	14:9 ZOOM VERT_AMPL	Not used
052	14:9 ZOOM VERT_SCOR	Not used
053	14:9 ZOOM VERT_SSYM	Not used
054	14:9 ZOOM TRAPEZE	Not used
055	14:9 ZOOM CUSHION	Not used
056	14:9 ZOOM HOR_COR_SYM	Not used
057	14:9 ZOOM HOR_CORNER	Not used
058	14:9 ZOOM HORZ_POS	Not used
059	14:9 ZOOM HORZ_AMPL	Not used
060	16:9 ZOOM VERT_POS	Not used
061	16:9 ZOOM VERT_AMPL	Not used
062	16:9 ZOOM VERT_SCOR	Not used
063	16:9 ZOOM VERT_SSYM	Not used
064	16:9 ZOOM TRAPEZE	Not used
065	16:9 ZOOM CUSHION	Not used
066	16:9 ZOOM HOR_COR_SYM	Not used
067	16:9 ZOOM HOR_CORNER	Not used
068	16:9 ZOOM HORZ_POS	Not used
069	16:9 ZOOM HORZ_AMPL	Not used
070	16:9 ZOOM SUBTITLE VERT_POS	Not used
071	16:9 ZOOM SUBTITLE VERT_AMPL	Not used
072	16:9 ZOOM SUBTITLE VERT_SCOR	Not used
073	16:9 ZOOM SUBTITLE VERT_SSYM	Not used
074	16:9 ZOOM SUBTITLE TRAPEZE	Not used
075	16:9 ZOOM SUBTITLE CUSHION	Not used
076	16:9 ZOOM SUBTITLE HOR_COR_SYM	Not used
077	16:9 ZOOM SUBTITLE HOR_CORNER	Not used
078	16:9 ZOOM SUBTITLE HORZ_POS	Not used
079	16:9 ZOOM SUBTITLE HORZ_AMPL	Not used
080	OSD Position	
081	BCLTHR Beam current threshold	
082	BCLG Beam current loop gain	
083	ROTATION (TILT)	
084	LSLSA Luma soft limiter	Fixed
085	LSLSB Luma soft limiter	Fixed
086	LSL2 Luma soft limiter	Fixed
087	LSLTA Luma soft limiter	Fixed
088	LSLTB Luma soft limiter	Fixed
089	REFERENCE WDR RED (NORMAL)	
090	REFERENCE WDR GREEN (NORMAL)	
091	REFERENCE WDR BLUE (NORMAL)	
092	REFERENCE CUTOFF RED	Fixed
093	REFERENCE CUTOFF GREEN	Fixed
094	REFERENCE CUTOFF BLUE	Fixed
095	IBRM	
096	WDRV	
097	ACC_SAT (COLOUR OFFSET)	
098	G2_CUTOFF_REFERENCE	Fixed

adjustment No.	adjustment part	description
099	G2_WDR_REFERENCE	Fixed
100	POFS2 (RGB HORIZANTAL SHIFT)	
101	REFERENCE WDR RED COOL	
102	REFERENCE WDR GREEN COOL	
103	REFERENCE WDR BLUE COOL	
104	REFERENCE WDR RED WARM	
105	REFERENCE WDR GREEN WARM	
106	REFERENCE WDR BLUE WARM	
107	STANDARD MODE BRIGHTNESS	
108	STANDARD MODE COLOUR	
109	STANDARD MODE CONTRAST	
110	FULL VERT_POS (16:9 MODE)	
111	FULL VERT_AMPL	
112	FULL VERT_SCOR	
113	FULL VERT_SSYM	
114	FULL TRAPEZE	
115	FULL CUSHION	
116	FULL HOR_COR_SYM	
117	FULL HOR_CORNER	
118	FULL HORZ_POS	
119	FULL HORZ_AMPL	
120	BRIGHT MODE BRIGHTNESS	
121	BRIGHT MODE COLOUR	
122	BRIGHT MODE CONTRAST	
123	SOFT MODE BRIGHTNESS	
124	SOFT MODE COLOUR	
125	SOFT MODE CONTRAST	
126	PERSONAL MODE FACTORY SETTING BRIGHTNESS	Fixed
127	PERSONAL MODE FACTORY SETTING COLOUR	Fixed
128	PERSONAL MODE FACTORY SETTING CONTRAST	Fixed
129	SCINC FOR PANORAMIC MODE	
130	SCINC1 FOR PANORAMIC MODE	
131	VOLUME AFTER APS	
132	VERTICAL SCROLL	
133	14:9 HORIZONTAL START	Not used
134	14:9 HORIZONTAL STOP	Not used
135	4:3 RGB HORIZONTAL AMPLITUDE	
136	4:3 RGB CUSHION	
137	14:9 RGB HORIZONTAL AMPLITUDE	Not used
138	14:9 RGB CUSHION	Not used
139	PANAROMIC RGB HORIZONTAL AMPLITUDE	Not used
140	16:9 RGB HORIZONTAL AMPLITUDE	Not used
141	16:9 SUBTITLE RGB HORIZONTAL AMPLITUDE	Not used
142	FULL RGB HORIZONTAL AMPLITUDE	
143	TELETEXT HORIZONTAL POSITION	

4.6 ADJUSTMENT PROCEDURE

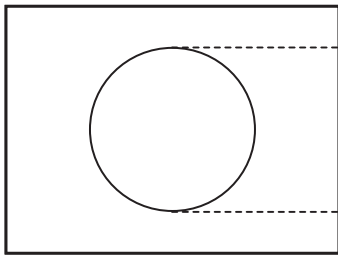
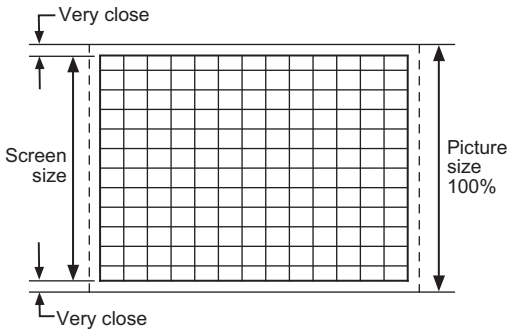
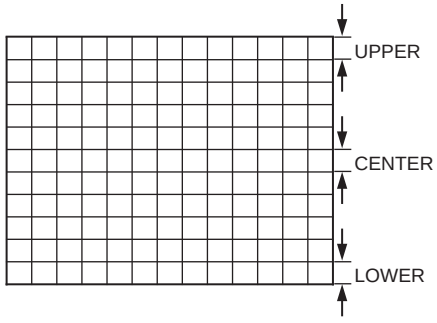
4.6.1 FOCUS / SCREEN ADJUSTMENT

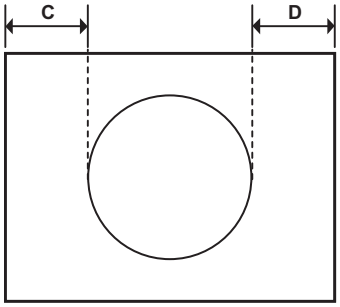
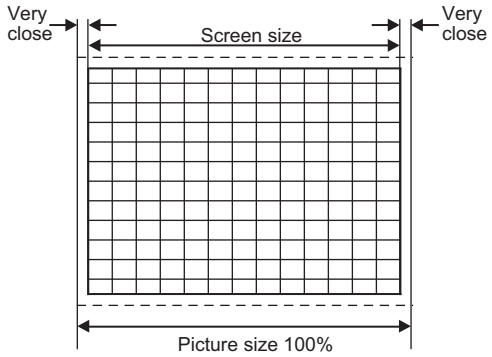
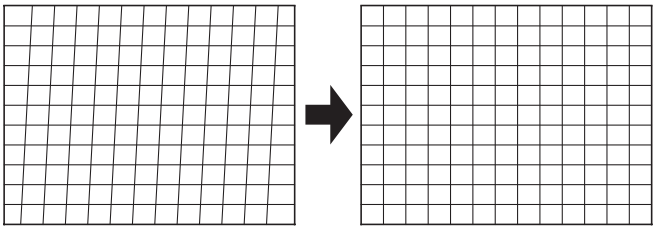
Item	Measuring instrument	Test point	Adjustment part	Description
FOCUS adjustment	Signal generator Remote control unit		FOCUS VR [On the FBT]	(1) Receive a PAL cross-hatch signal. (2) Adjust FOCUS VR on the FBT as thin as possible. 
SCREEN adjustment	Remote control unit		SCREEN VR [On the FBT]	(1) Enter the OPTIONS MENU. (2) Select option No.002 and change bit 6 from 0 to 1 disabling vertical scan. Then horizontal line appears. (3) Adjust horizontal line as thin as possible via screen adjust pot. (4) Press number 0 key to leave service menu.
				

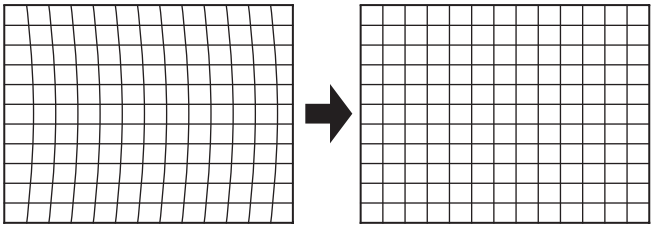
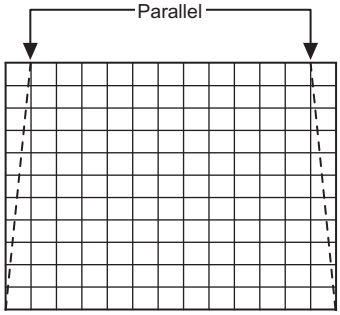
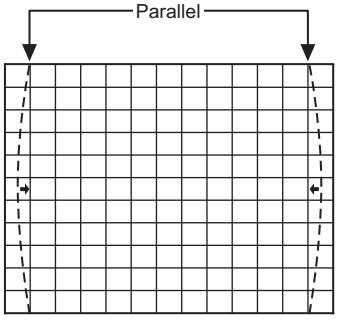
4.6.2 AGC ADJUSTMENT

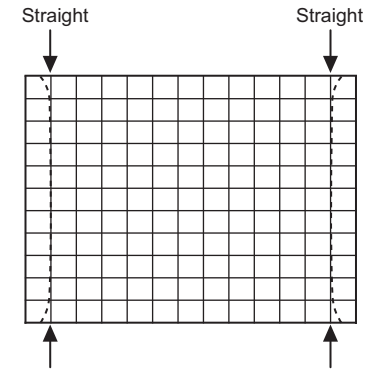
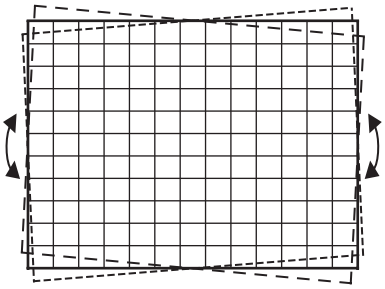
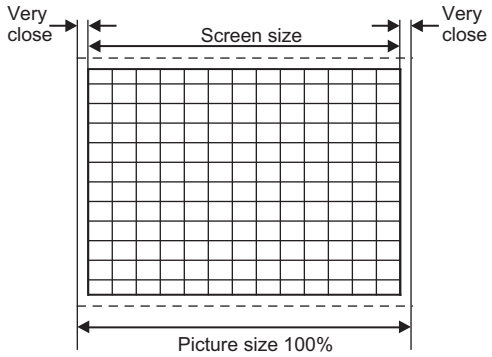
Item	Measuring instrument	Test point	Adjustment part	Description
AGC adjustment	Signal generator Remote control unit Volt meter		003	(1) Receive a PAL BG signal at 60dBμV RF signal level. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 003. (5) Adjust 003 by pressing till voltage at pin 1 of TUNER is equal to 3.0V.

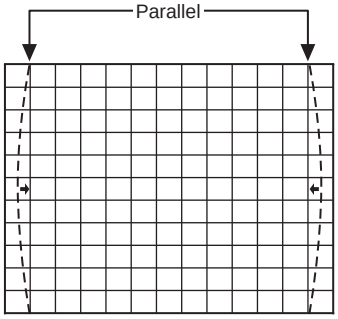
4.6.3 DEFLECTION CIRCUIT ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL POSITION adjustment	Signal generator Remote control unit		030 110 (16:9 mode)	(1) Receive a PAL circle pattern signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 030. (5) Adjust 030 to make A=B. (6) Check and readjust 030 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 110 (16:9 mode). (8) Adjust 110 in the same procedure.
				
VERTICAL SIZE adjustment	Signal generator Remote control unit		031 111 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 031. (5) Adjust 031 until horizontal black lines on both the upper and lower part of the cross-hatch pattern become very closeted the upper and lower horizontal sides of picture size and nearly about to disappear. (6) Check and readjust 031 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 111 (16:9 mode). (8) Adjust 111 in the same procedure.
				
VERTICAL S-CORRECTION & LINEARITY adjustment	Signal generator Remote control unit		032 033 112 (16:9 mode) 113 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 032. (5) Adjust 032 till the size of squares on both the upper and lower part of cross-hatch pattern become equal to the squares laying on the vertical center of the cross-hatch pattern. (6) Check and readjust 032 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 033. (8) Adjust 033 till all the size of squares of the cross-hatch pattern become in equal size from the top of the screen to its bottom of the whole screen. (9) Check and readjust 033 item if the adjustment becomes improper after some other geometric adjustments (especially after than S-COR adjustment) are done. (10) Select 112 (16:9 mode). (11) Adjust 112 in the same procedure as 5. (12) Select 113 (16:9 mode). (13) Adjust 113 in the same procedure as 8.
				

Item	Measuring instrument	Test point	Adjustment part	Description
HORIZONTAL POSITION adjustment	Signal generator Remote control unit		038 118 (16:9 mode)	(1) Receive a PAL circle pattern signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 038. (5) Adjust 038 to make C=D. (6) Check and readjust 038 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 118 (16:9 mode). (8) Adjust 118 in the same procedure.
				
HORIZONTAL SIZE adjustment	Signal generator Remote control unit		039 119 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 039. (5) Adjust 039 until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust 039 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 119 (16:9 mode). (8) Adjust 119 in the same procedure.
				
ANGLE adjustment	Signal generator Remote control unit		016	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 016. (5) Adjust 016 till the vertical lines of the cross-hatch pattern become straight. (6) Check and readjust 016 item if the adjustment becomes improper after some other geometric adjustments are done.
				

Item	Measuring instrument	Test point	Adjustment part	Description
BOW adjustment	Signal generator Remote control unit		017	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 017. (5) Adjust 017 till the vertical lines become straight. (6) Check and readjust 017 item if the adjustment becomes improper after some other geometric adjustments are done. **NOTE:** In case where there is a bow-shaped distortion of images on the screen. (Figure)
				
TRAPEZIUM adjustment	Signal generator Remote control unit		034 114 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 034. (5) Adjust 034 till vertical lines, especially lines at the sides of the picture frame become parallel to the both sides of picture tubes as close as possible. (6) Check and readjust 034 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 114 (16:9 mode). (8) Adjust 114 in the same procedure.
				
SIDE PIN adjustment	Signal generator Remote control unit		035 115 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 035. (5) Adjust 035 till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust 035 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 115 (16:9 mode). (8) Adjust 115 in the same procedure.
				

Item	Measuring instrument	Test point	Adjustment part	Description
CORNER adjustment	Signal generator Remote control unit		036 037 116 (16:9 mode) 117 (16:9 mode)	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 036. (5) Adjust 036 till vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. (6) Check and readjust 036 item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 037. (8) Adjust 037 till vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. (9) Check and readjust 037 item if the adjustment becomes improper after some other geometric adjustments are done. (10) Select 116 (16:9 mode). (11) Adjust 116 in the same procedure as 5. (12) Select 117 (16:9 mode). (13) Adjust 117 in the same procedure as 8.
				
ROTATION adjustment	Signal generator Remote control unit		083	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 083. (5) Adjust 083 to rotate the complete master clock-wise and counter clock-wise depending on the CRT. (6) Check and readjust 083 item if the adjustment becomes improper after some other geometric adjustments are done.
				
NTSC HORIZONAL SIZE adjustment	Signal generator Remote control unit		135 142 (16:9 mode)	(1) Receive a NTSC cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 135. (5) Adjust 135 till vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select 142 (16:9 mode). (8) Adjust 142 in the same procedure.
				

Item	Measuring instrument	Test point	Adjustment part	Description
NTSC SIDE PIN adjustment	Signal generator Remote control unit		136	(1) Receive a NTSC cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 136. (5) Adjust 136 till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust 136 item if the adjustment becomes improper after some other geometric adjustments are done.
				
TELETEXT SCREEN adjustment	Signal generator Remote control unit		143	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 143. (5) Adjust 143 to adjust the proper vertical size of Teletext screen. (6) Check and readjust 143 item if the adjustment becomes improper after some other geometric adjustments are done.

4.6.4 VIDEO CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE adjustment	Signal generator Remote control unit		023 024 025	(1) Receive a PAL black & white signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 023, 024 and 025 respectively. (5) Adjust 023, 024 and 025 respectively, until the white part turns to pure white without any other colour.
COLOUR CUTOFF LEVEL adjustment	Signal generator Remote control unit		026 027 028	(1) Receive a PAL cross-hatch signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 026, 027 and 028 respectively. (5) Adjust 026, 027 and 028 respectively, until the black part turns to pure black without any other colour.
PAL Y DELAY adjustment	Signal generator Remote control unit		006	(1) Receive a PAL colour bar signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 006. (5) Adjust 006 till the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other.
SECAM Y DELAY adjustment	Signal generator Remote control unit		007	(1) Receive a SECAM colour bar signal. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 007. (5) Adjust 007 by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colouers between transients do not mix with each other.
NTSC Y DELAY adjustment	Signal generator Remote control unit		008	(1) Receive a NTSC colour bar signal from an external source (e.g. FRONT AV : EXT-3). (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select 008. (5) Adjust 008 by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colouers between transients do not mix with each other.

SECTION 5
TROUBLESHOOTING

This service manual does not describe TROUBLESHOOTING.

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(No.52137)

Printed in Japan
WPC